

FCC Test Report

Product Name : 2.4GHz Digital RF Module
Trade Name : NEXXT SOLUTIONS
Model No. : ACW-HD380M
FCC ID. : X4YSTRYC

Applicant : NEXXT SOLUTIONS
Address : 3505 N.W 107TH AVE. MIAMI, Florida
33178, United States

Date of Receipt : Feb. 03, 2016
Issued Date : Mar. 24, 2016
Report No. : 1620340R-RFUSP01V00
Report Version : V1.0



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : Mar. 24, 2016

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Address : 3505 N.W 107TH AVE. MIAMI, Florida 33178, United States
Manufacturer : NEXXT SOLUTIONS
Model No. : ACW-HD380M
FCC ID. : X4YSTRYC
EUT Voltage : DC 5V (Power by Adapter)
Testing Voltage : DC 5V (Power by Adapter)
Trade Name : NEXXT SOLUTIONS
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2014
Test Lab : QuieTek Hsin Chu Laboratory
Test Result : Complied

The test results relate only to the samples tested.

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Documented By :

A handwritten signature in blue ink, appearing to read "Demi Chang".

(Demi Chang / Senior Engineering Adm. Specialist)

Tested By :

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(Jimmie Liu / Senior Engineer)

Approved By :

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(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1620340R-RFUSP01V00	V1.0	Initial issue of report	Mar. 24, 2016

Laboratory Information

We, **Quietek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	: TAF, Accreditation Number: 3024
USA	: FCC, Registration Number: 365520
Canada	: IC, Submission No: 181665 / IC Registration Number: 4075C-4

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site:

<http://www.quietek.com/english/about/certificates.aspx?bval=5>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :

http://www.quietek.com/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TABLE OF CONTENTS

Description	Page
1. General Information.....	8
1.1. EUT Description	8
1.2. Test Mode	9
1.3. Tested System Details	10
1.4. Configuration of tested System	10
1.5. EUT Exercise Software	10
1.6. Test Facility	11
2. Conducted Emission	12
2.1. Test Equipment.....	12
2.2. Test Setup	12
2.3. Limits	13
2.4. Test Procedure	13
2.5. Test Specification.....	13
2.6. Uncertainty	13
2.7. Test Result.....	14
3. Peak Power Output	15
3.1. Test Equipment.....	15
3.2. Test Setup	15
3.3. Test procedures.....	15
3.4. Limits	15
3.5. Test Specification.....	15
3.6. Test Result.....	16
4. Radiated Emission	17
4.1. Test Equipment.....	17
4.2. Test Setup	18
4.3. Limits	19
4.4. Test Procedure	20
4.5. Test Specification.....	20

4.6.	Test Result.....	21
5.	RF antenna conducted test	29
5.1.	Test Equipment.....	29
5.2.	Test Setup	29
5.3.	Limits	30
5.4.	Test Procedure	30
5.5.	Test Specification.....	30
5.6.	Test Result.....	31
6.	Band Edge.....	34
6.1.	Test Equipment.....	34
6.2.	Test Setup	34
6.3.	Limits	35
6.4.	Test Procedure	35
6.5.	Test Specification.....	35
6.6.	Test Result.....	36
7.	DTS Occupied Bandwidth	44
7.1.	Test Equipment.....	44
7.2.	Test Setup	44
7.3.	Test Procedures	44
7.4.	Limits	44
7.5.	Test Specification.....	44
7.6.	Uncertainty	44
7.7.	Test Result.....	45
8.	Power Density	48
8.1.	Test Equipment.....	48
8.2.	Test Setup	48
8.3.	Limits	48
8.4.	Test Procedures	48
8.5.	Test Specification.....	48
8.6.	Uncertainty	48
8.7.	Test Result.....	49

Attachment 1.....	52
Test Setup Photograph.....	52
Attachment 2.....	54
EUT External Photograph.....	54
Attachment 3.....	55
EUT Internal Photograph.....	55

1. General Information

1.1. EUT Description

Product Name	2.4GHz Digital RF Module
Trade Name	NEXXT SOLUTIONS
Model No.	ACW-HD380M

Frequency Range/Channel Number	2408~2468MHz / 16 Channels
Type of Modulation	GFSK
Antenna 1 Type /Gain	Dipole / 2dBi
Antenna 2 Type /Gain	Dipole / 1.2dBi

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01	2408 MHz	Channel 05	2424 MHz	Channel 09	2440 MHz	Channel 13	2456 MHz
Channel 02	2412 MHz	Channel 06	2428 MHz	Channel 10	2444 MHz	Channel 14	2460 MHz
Channel 03	2416 MHz	Channel 07	2432 MHz	Channel 11	2448 MHz	Channel 15	2464 MHz
Channel 04	2420 MHz	Channel 08	2436 MHz	Channel 12	2452 MHz	Channel 16	2468 MHz

Note:

1. This device is a 2.4GHz Digital RF Module including 2.4G transmitting function.
2. These test results on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regards to the frequency band operation; the lowest 、middle and highest frequency of channel were selected to perform the test, and then shown on this report.

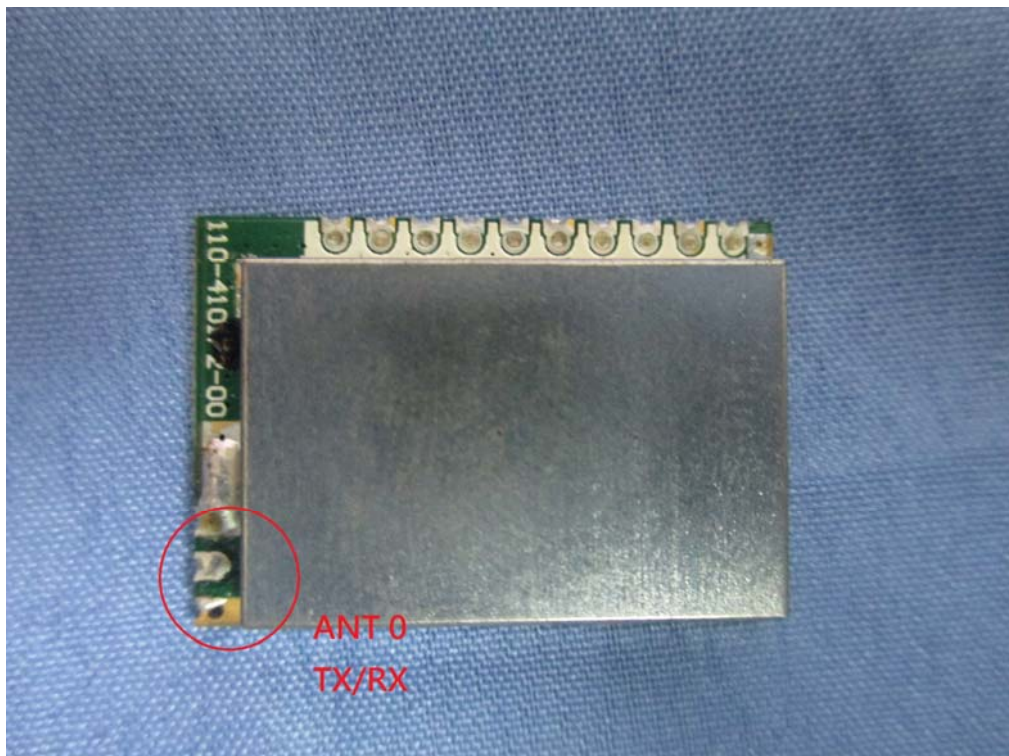
1.2. Test Mode

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-Test Mode	
Test Mode	Mode 1: Transmit Mode
Final Test Mode	
Test Mode	Mode 1: Transmit Mode

Test Items	Mode	Modulation	Channel	Antenna	Result
Conducted Emission	N/A	GFSK	09	0	Complies
Peak Power Output	1	GFSK	01/09/16	0	Complies
Radiated Emission	1	GFSK	01/09/16	0	Complies
RF antenna conducted test	1	GFSK	01/09/16	0	Complies
Radiated Emission Band Edge	1	GFSK	01/16	0	Complies
Occupied Bandwidth	1	GFSK	01/09/16	0	Complies
Power Density	1	GFSK	01/09/16	0	Complies

1TX / 1RX

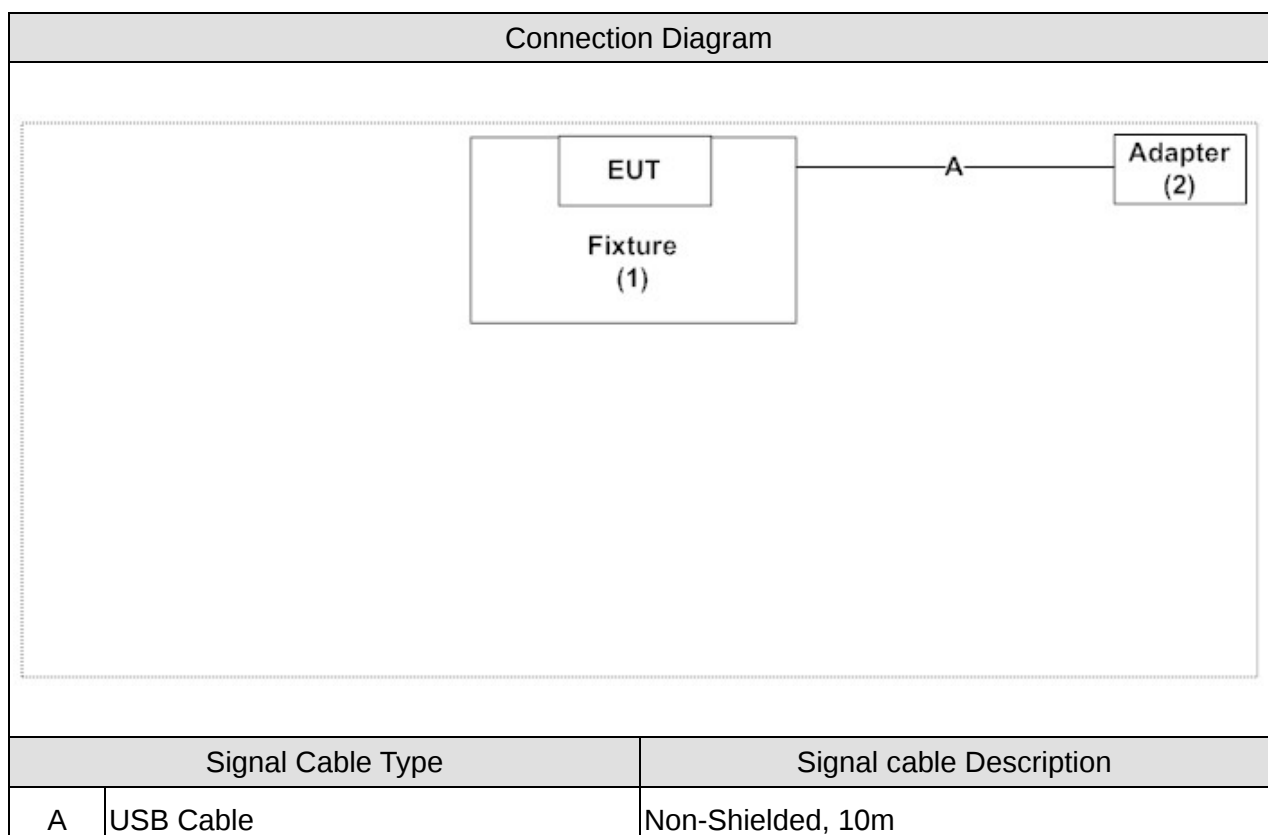


1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Fixture	TRANWO	N/A	N/A	DoC	--
2 Adapter	Transin	TS-A007-09008A1	N/A	DoC	Non-Shielded, 1.6m

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Turn on the EUT.
3	Long press the button for 10 seconds to enter the engineering mode.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	20
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Peak Power Output	15 - 35	24
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Radiated Emission	15 - 35	25
Humidity (%RH)		25 - 75	54
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Band Edge	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Occupied Bandwidth	15 - 35	24
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 RF antenna conducted test	15 - 35	24
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Power Density	15 - 35	24
Humidity (%RH)		25 - 75	45
Barometric pressure (mbar)		860 - 1060	950-1000

2. Conducted Emission

2.1. Test Equipment

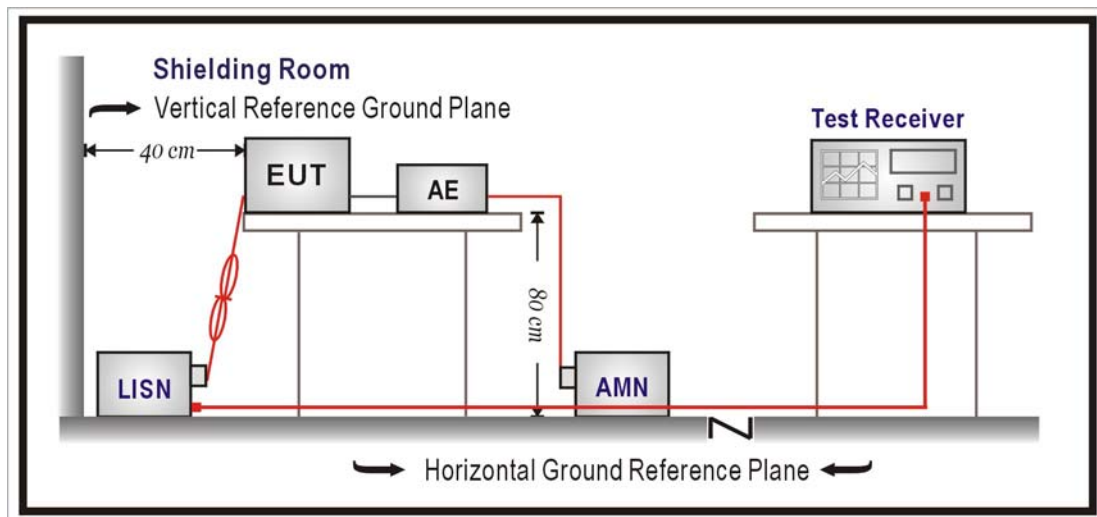
The following test equipments are used during the test:

Conducted Emission / SR2

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2017/01/20
LISN	R&S	ENV216	100092	2016/08/17
Test Receiver	R&S	ESCS 30	825442/014	2016/07/16

Note: All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2014

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

Owing to the DC operation of EUT, this test item is not performed.

3. Peak Power Output

3.1. Test Equipment

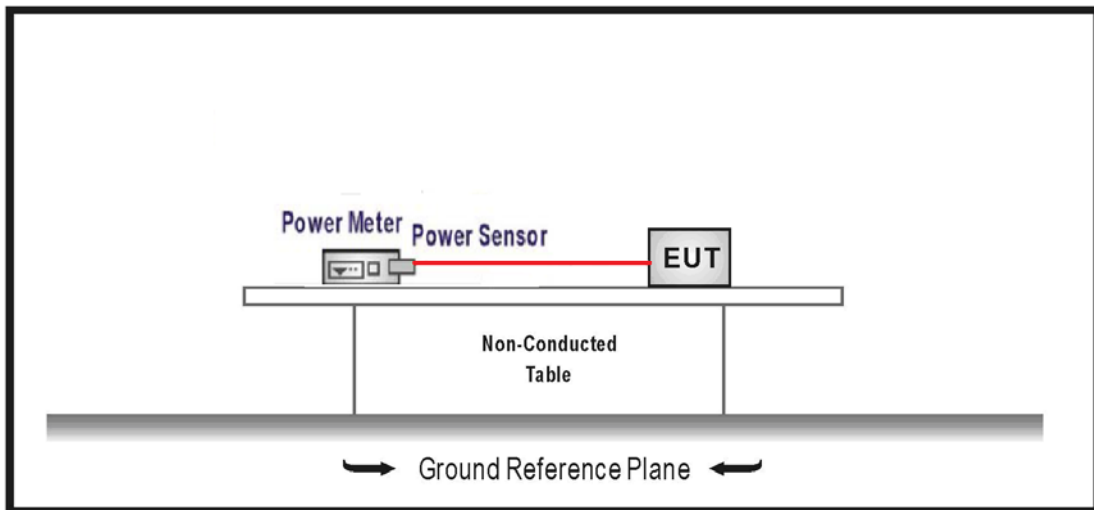
The following test equipment is used during the test:

Peak Power Output / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Power Meter	Agilent	N1911A	MY45101353	2016/10/11
Power Sensor	Agilent	N1921A	MY45241670	2016/10/11

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2. Test Setup



3.3. Test procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 V03R04 for compliance to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

3.6. Test Result

Product	2.4GHz Digital RF Module		
Test Item	Peak Power Output		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/03/21	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2408	17.35	≤ 30	Pass
09	2440	18.03	≤ 30	Pass
16	2468	18.29	≤ 30	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipments are used during the test:

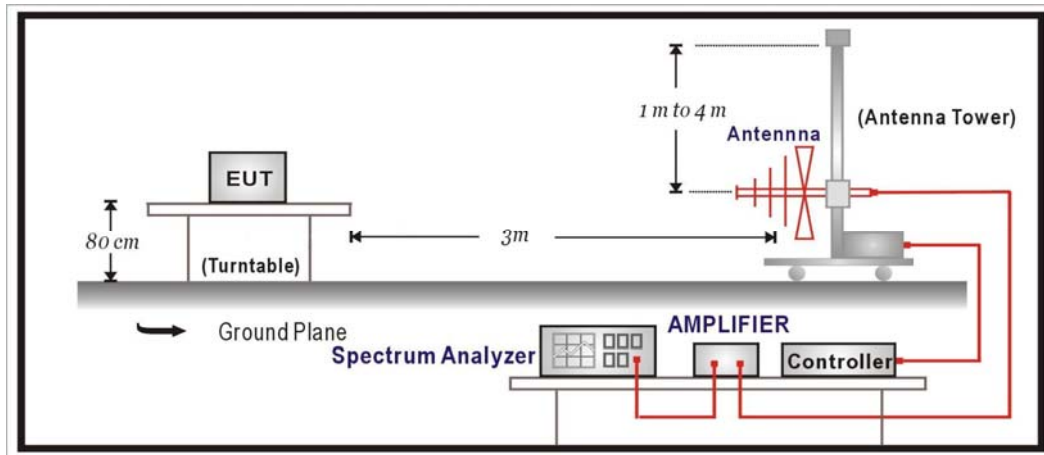
Radiated Emission / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	Schaffner	CBL6112B	2895	2016/08/14
Double Ridged Guide Horn Antenna	Schwarzbeck	BBHA 9120	D743	2017/01/14
Pre-Amplifier	EMCI	EMC0031835	4583/10/13	2017/01/26
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2017/01/03
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/12/24
k Type Cable	Huber+Suhner	SF 102	25623/2	2017/01/11
Horn Antenna	Schwarzbeck	BBHA 9170	203	2016/09/07
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/05

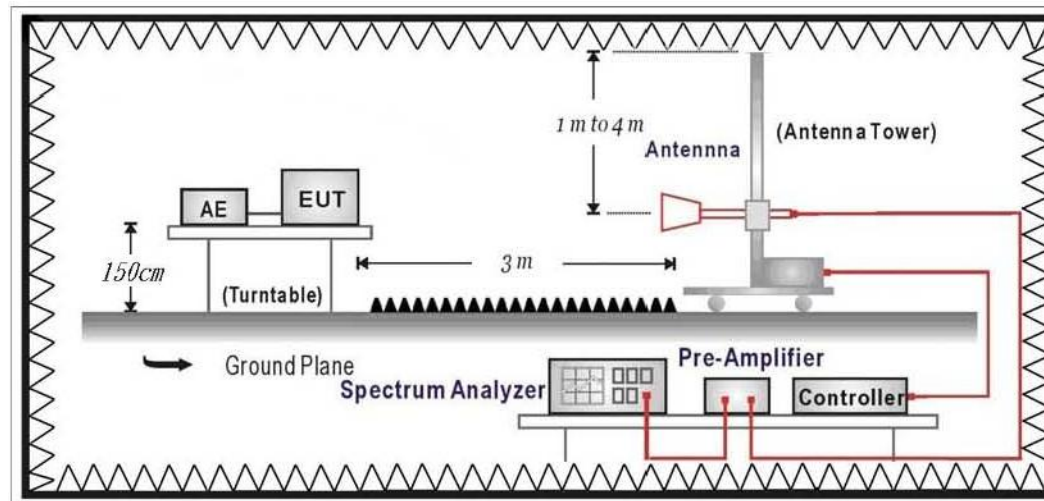
Note: All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 V03R04 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground (under 1GHz) or 1.5 meter above ground (above 1GHz). The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

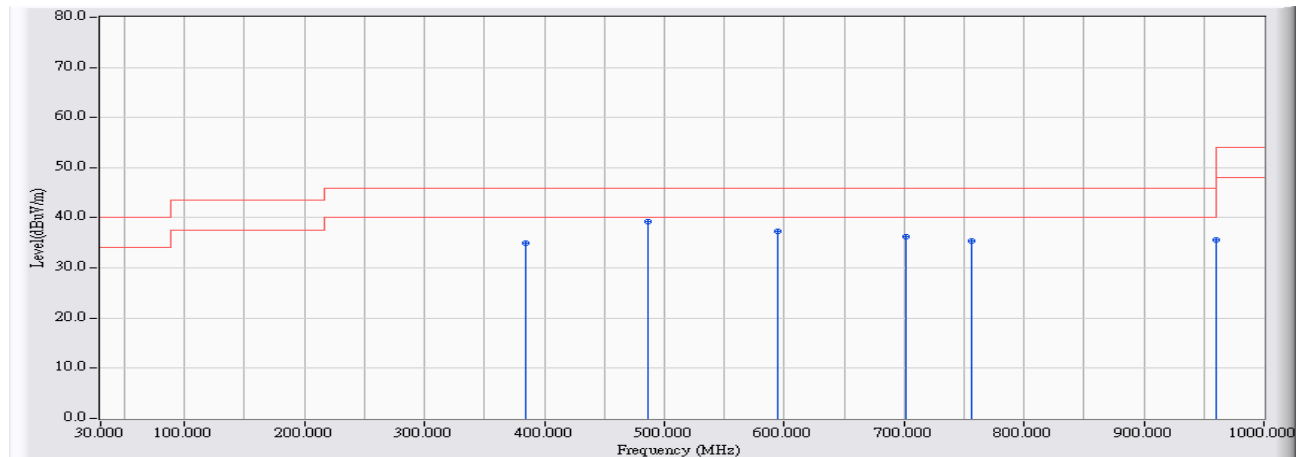
4.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

4.6. Test Result

30MHz-1GHz Spurious

Site : CB1	Time : 2016/03/18 - 17:57
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_30M-1G-4_9161 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2440 MHz

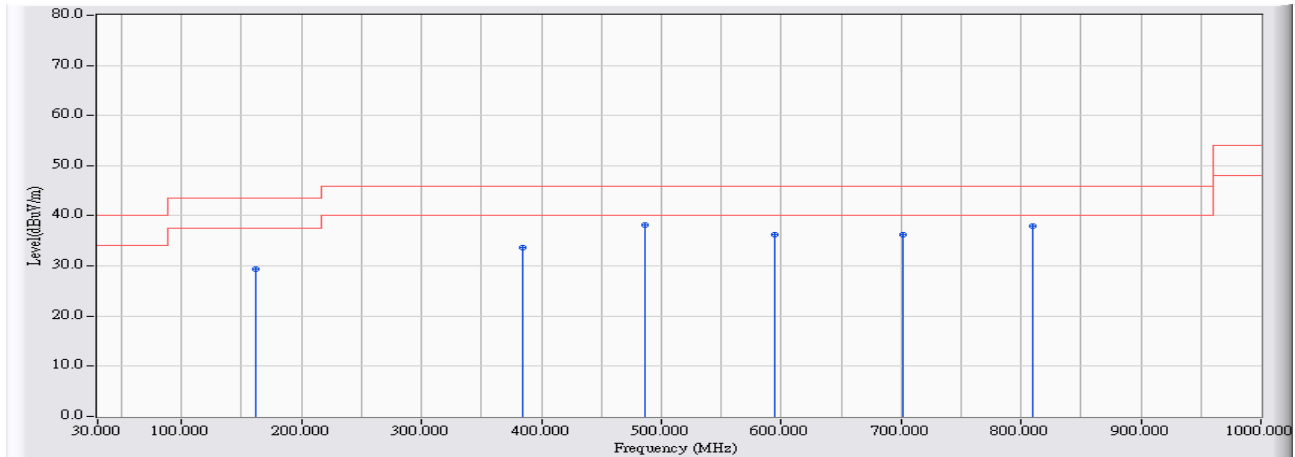


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		383.974	15.597	19.281	34.878	-11.122	46.000	QUASIPeAK
2	*	485.982	17.585	21.696	39.281	-6.719	46.000	QUASIPeAK
3		594.004	19.586	17.726	37.312	-8.688	46.000	QUASIPeAK
4		701.994	21.087	15.115	36.203	-9.797	46.000	QUASIPeAK
5		755.956	21.768	13.524	35.292	-10.708	46.000	QUASIPeAK
6		959.973	24.026	11.602	35.628	-10.372	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2016/03/18 - 17:58
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_30M-1G-4_9161 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2440 MHz



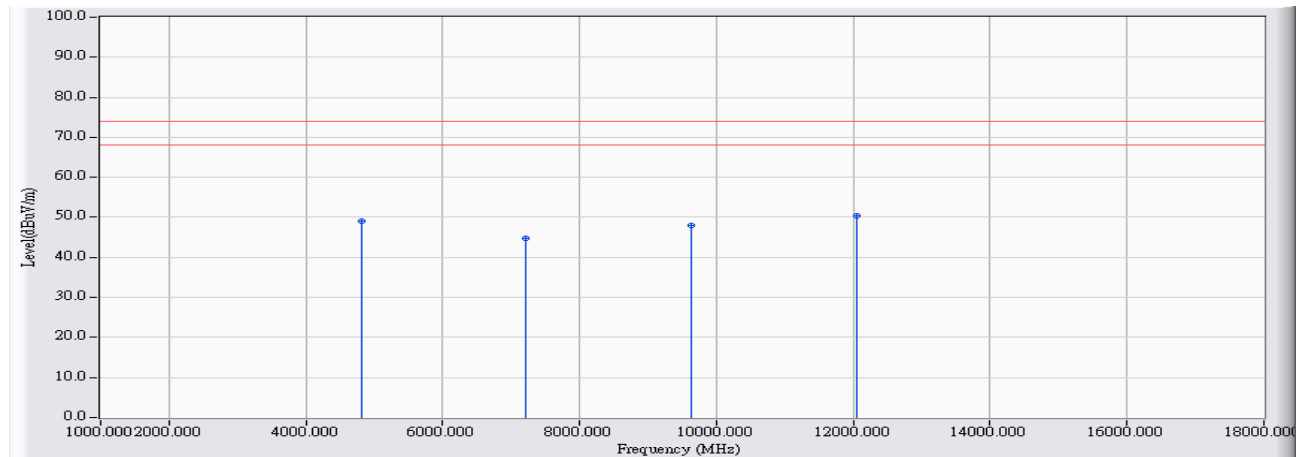
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		161.980	17.596	11.877	29.473	-14.027	43.500	QUASIPeAK
2		383.974	15.597	17.977	33.574	-12.426	46.000	QUASIPeAK
3	*	485.982	17.585	20.621	38.206	-7.794	46.000	QUASIPeAK
4		593.972	19.585	16.615	36.201	-9.799	46.000	QUASIPeAK
5		701.961	21.087	15.085	36.172	-9.828	46.000	QUASIPeAK
6		809.983	22.437	15.624	38.061	-7.939	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Harmonic & Spurious:

Site : CB1	Time : 2016/03/14 - 13:20
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2408MHz

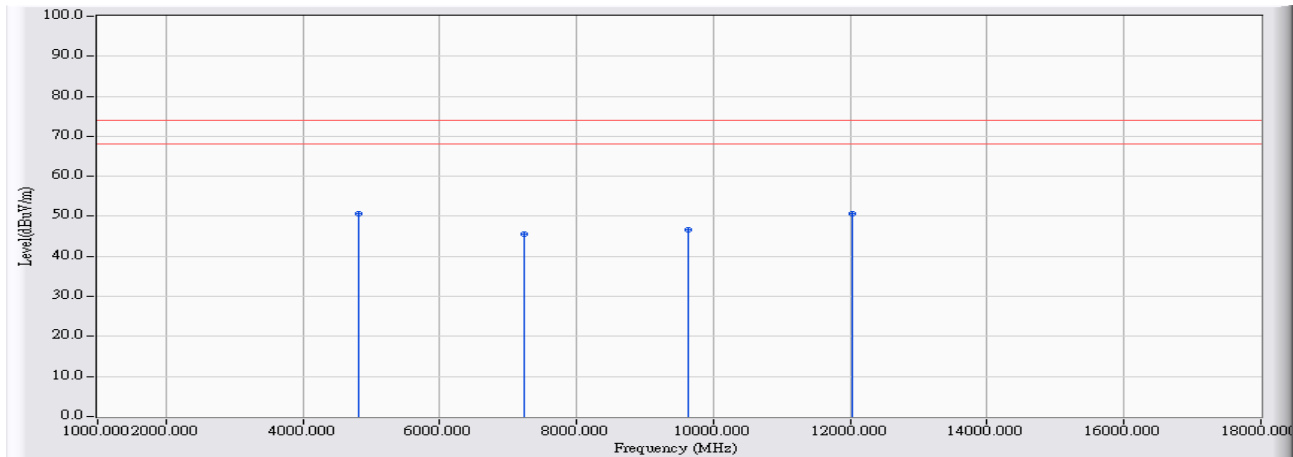


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4815.530	-7.046	56.090	49.043	-24.957	74.000	PEAK
2		7216.000	-0.819	45.460	44.642	-29.358	74.000	PEAK
3		9639.000	4.993	42.940	47.932	-26.068	74.000	PEAK
4	*	12048.000	8.355	42.130	50.485	-23.515	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2016/03/14 - 13:31
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2408MHz

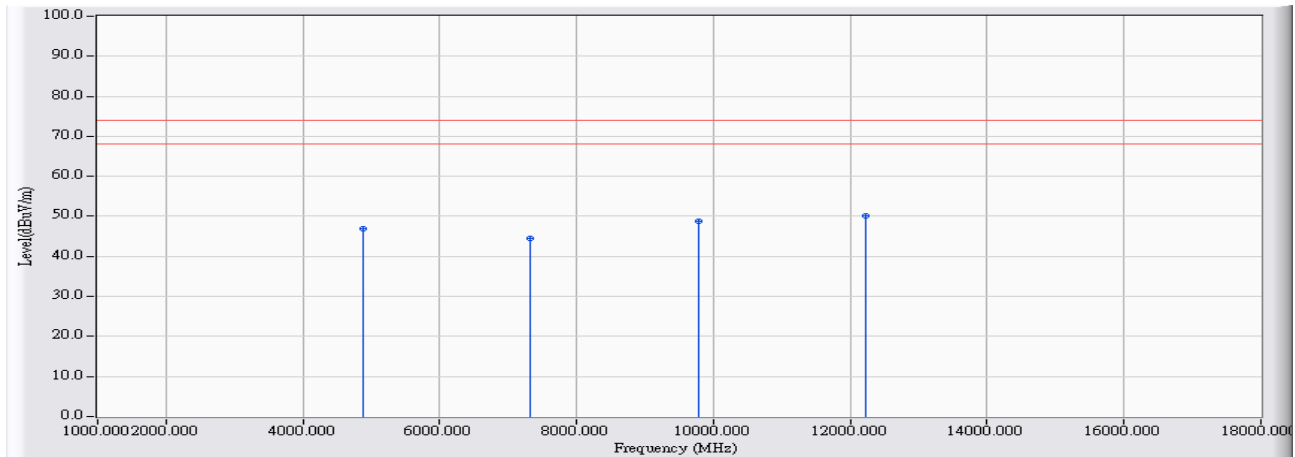


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4813.000	-9.395	60.090	50.695	-23.305	74.000	PEAK
2		7226.000	0.151	45.500	45.651	-28.349	74.000	PEAK
3		9632.000	4.122	42.500	46.622	-27.378	74.000	PEAK
4	*	12032.000	8.118	42.620	50.738	-23.262	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2016/03/14 - 13:42
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2440MHz

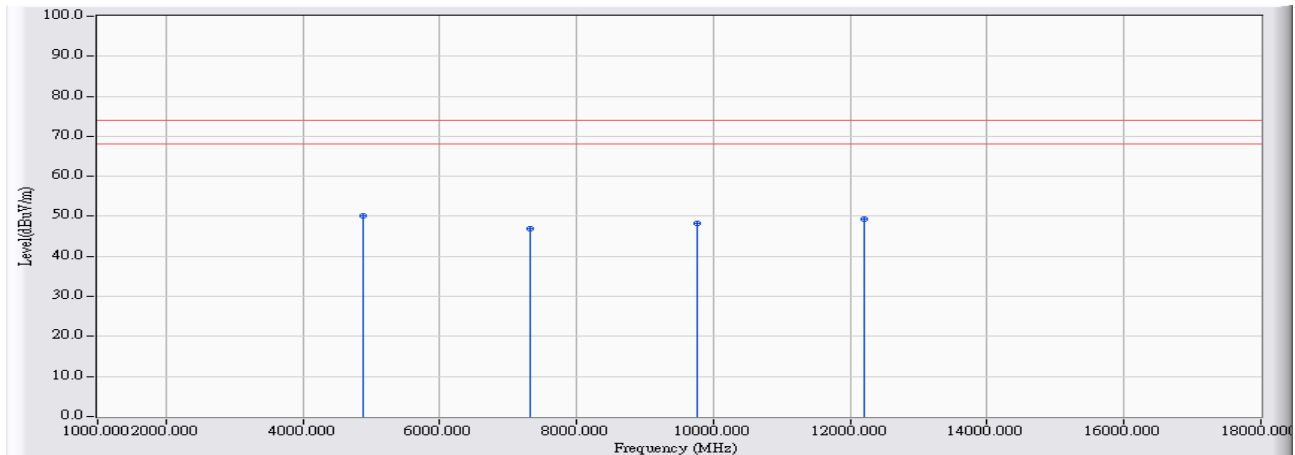


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4877.000	-6.971	53.950	46.979	-27.021	74.000	PEAK
2		7313.000	-0.600	45.070	44.471	-29.529	74.000	PEAK
3		9773.000	5.538	43.160	48.698	-25.302	74.000	PEAK
4	*	12214.000	8.362	41.700	50.062	-23.938	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2016/03/14 - 13:49
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2440MHz

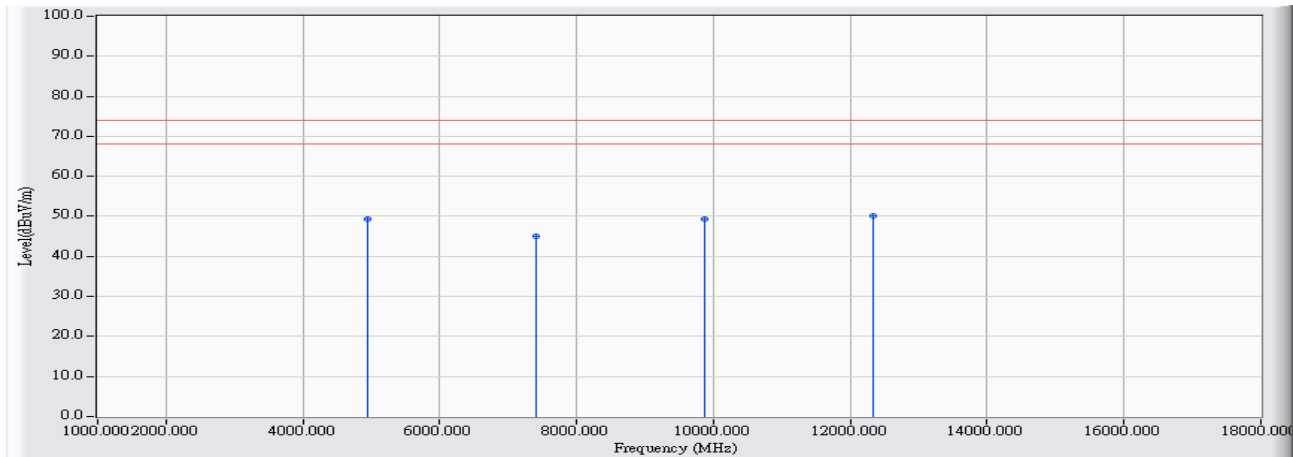


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4881.000	-9.034	59.040	50.007	-23.993	74.000	PEAK
2		7323.000	0.405	46.500	46.905	-27.095	74.000	PEAK
3		9756.000	4.686	43.510	48.197	-25.803	74.000	PEAK
4		12197.000	8.009	41.270	49.279	-24.721	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2016/03/14 - 13:59
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2468MHz

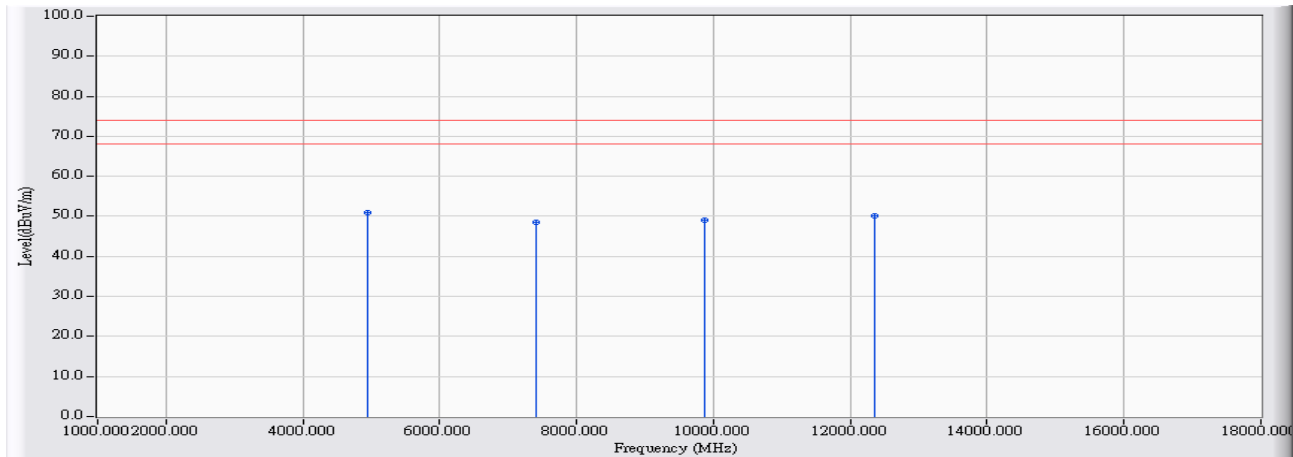


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4937.000	-6.897	56.300	49.403	-24.597	74.000	PEAK
2		7406.000	-0.384	45.390	45.007	-28.993	74.000	PEAK
3		9865.000	5.900	43.410	49.310	-24.690	74.000	PEAK
4	*	12343.000	8.335	41.910	50.245	-23.755	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2016/03/14 - 14:06
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2468MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4936.000	-8.742	59.550	50.809	-23.191	74.000	PEAK
2		7406.000	0.636	47.770	48.407	-25.593	74.000	PEAK
3		9875.000	5.209	43.720	48.929	-25.071	74.000	PEAK
4		12353.000	7.865	42.180	50.044	-23.956	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 13GHz were not included is because their levels are too low.

5. RF antenna conducted test

5.1. Test Equipment

The following test equipment is used during the test:

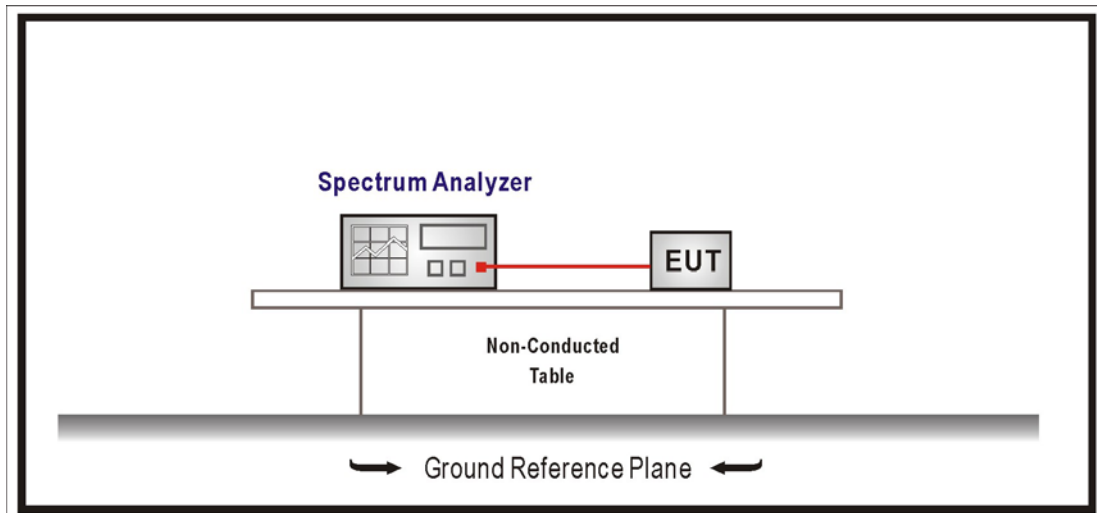
RF antenna conducted test / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/05

Note: All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup

RF Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on an RF conducted or radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 V03R04 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

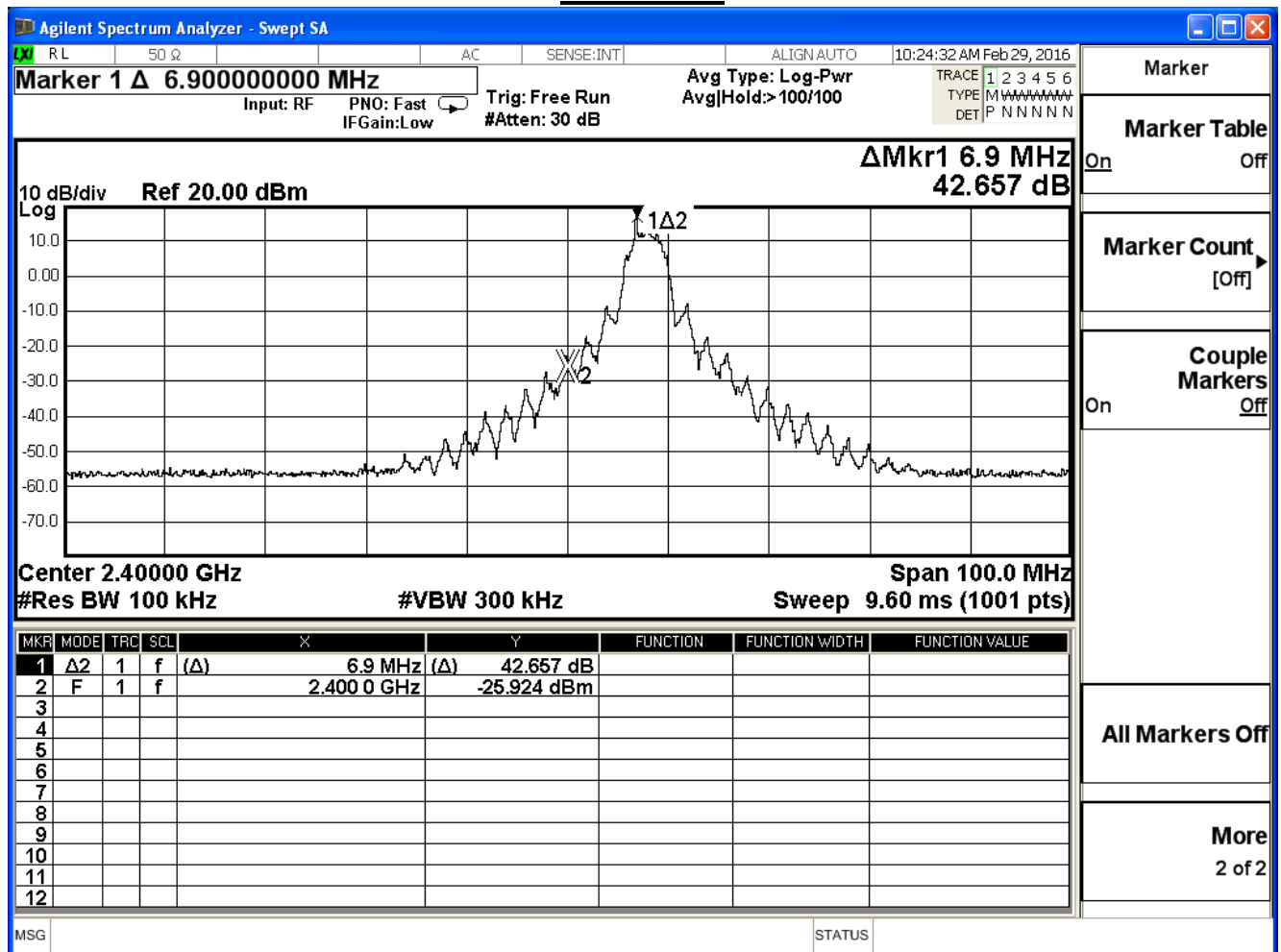
5.6. Test Result

Product	2.4GHz Digital RF Module		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/02/29	Test Site	SR7

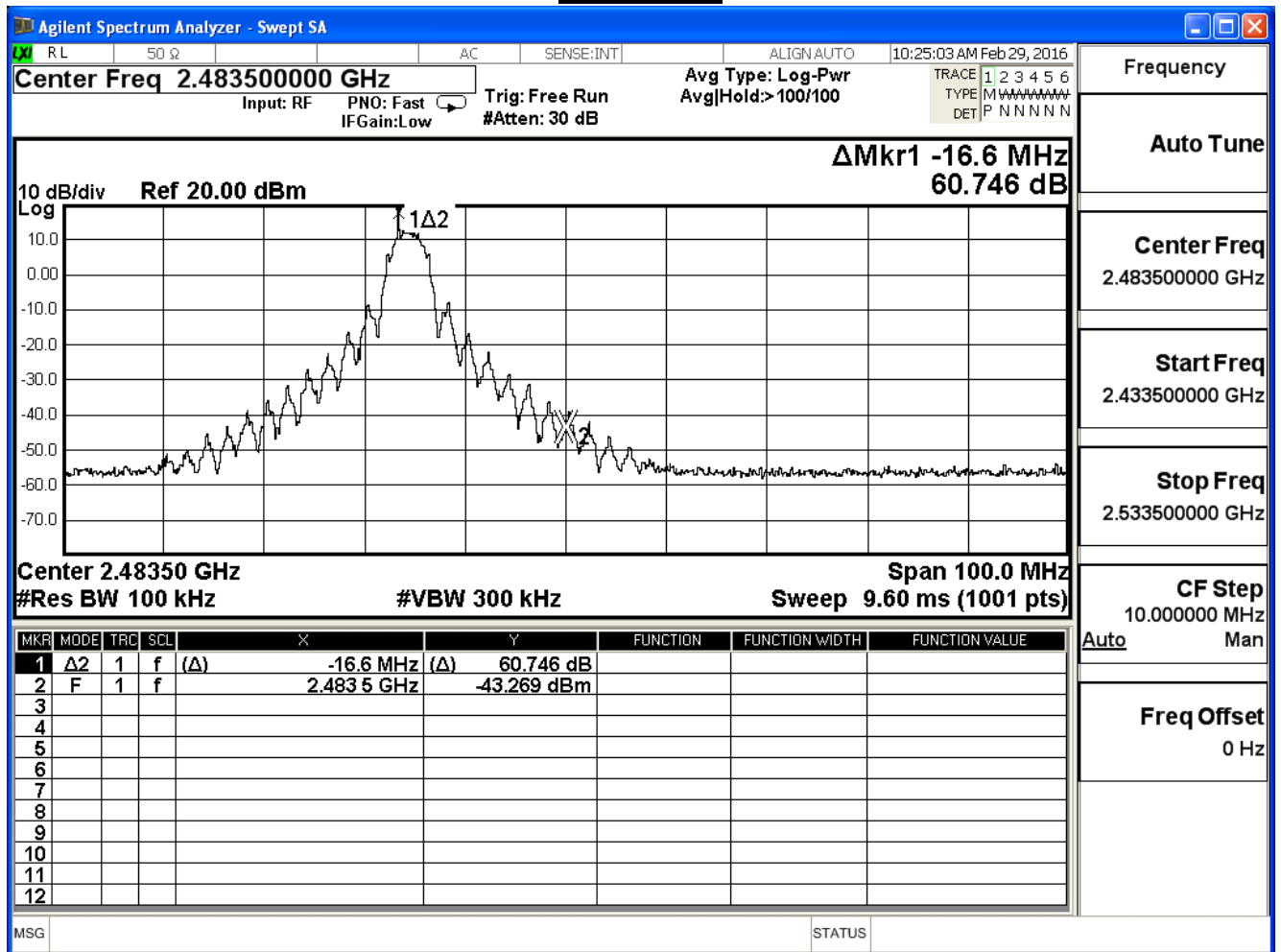
GFSK

Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
01	2408	42.657	≥ 20	Pass
16	2468	60.746	≥ 20	Pass

Channel 01

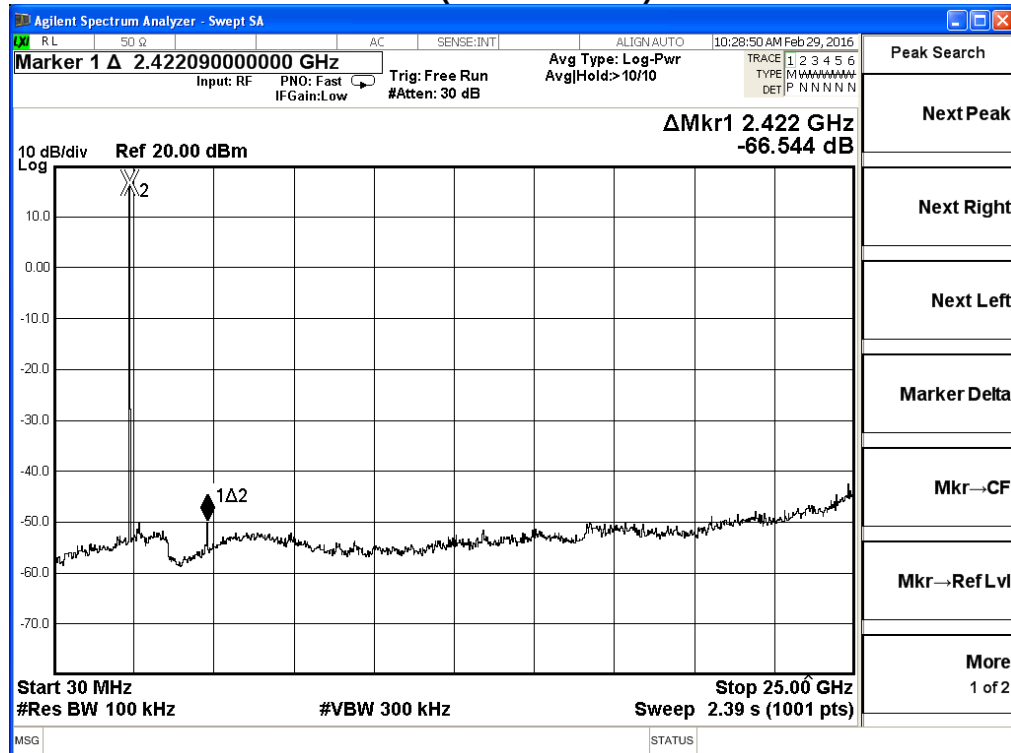


Channel 16

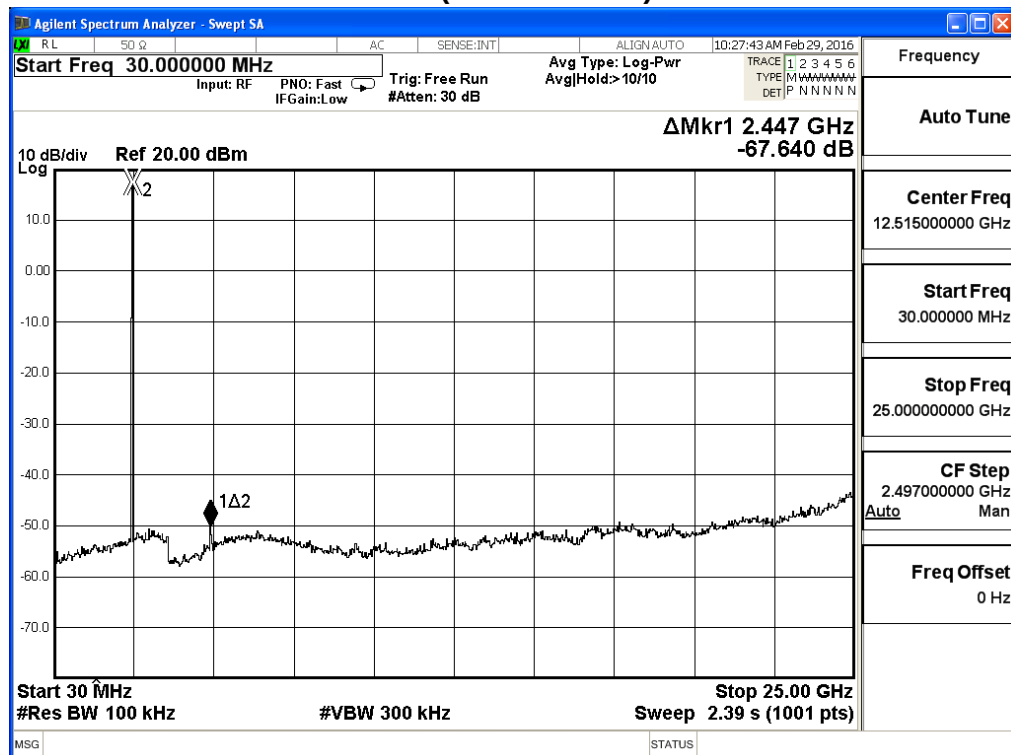


Product	2.4GHz Digital RF Module		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/02/29	Test Site	SR7

Channel 01 (30MHz-25GHz)- GFSK



Channel 16 (30MHz-25GHz)- GFSK



6. Band Edge

6.1. Test Equipment

The following test equipments are used during the test:

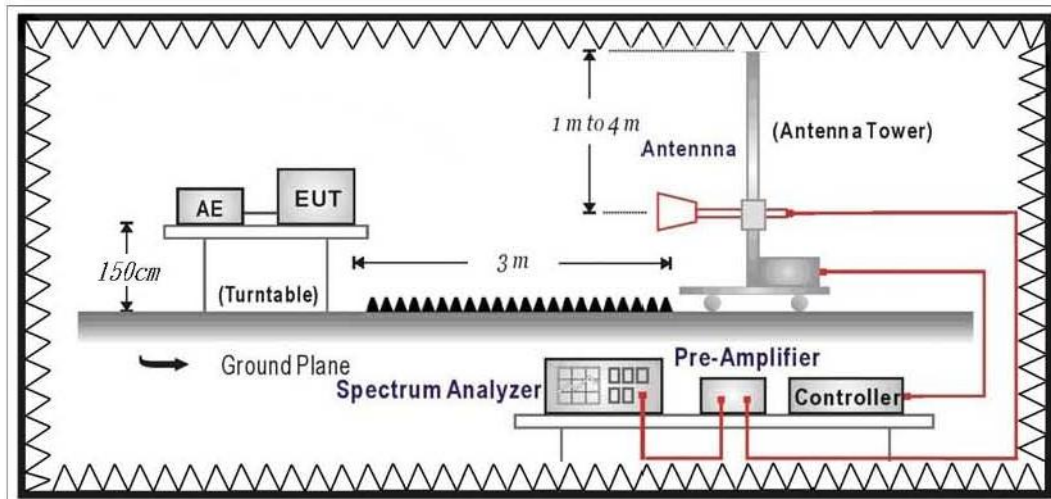
Band Edge / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Double Ridged Guide Horn Antenna	Schwarzbeck	BBHA 9120	D743	2017/01/14
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/12/24
k Type Cable	Huber+Suhner	SF 102	25623/2	2017/01/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/05

Note: All equipments that need to calibrate are with calibration period of 1 year.

6.2. Test Setup

RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 V03R04 for compliance to FCC 47CFR 15.247 requirements. The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

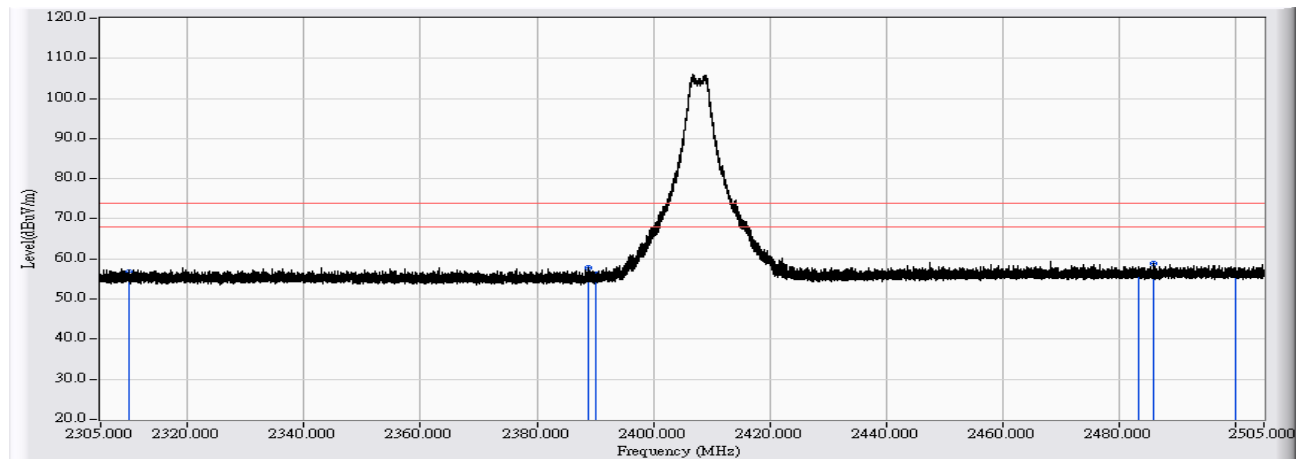
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

6.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

6.6. Test Result

Site : CB1	Time : 2016/03/18 - 17:53
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2408MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	28.366	28.269	56.635	-17.365	74.000	PEAK
2		2388.910	28.705	28.973	57.677	-16.323	74.000	PEAK
3		2390.000	28.709	27.540	56.249	-17.751	74.000	PEAK
4		2483.500	29.110	26.925	56.035	-17.965	74.000	PEAK
5	*	2486.141	29.122	29.704	58.825	-15.175	74.000	PEAK
6		2500.000	29.183	26.790	55.972	-18.028	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	2.4GHz Digital RF Module		
Test Item	Band edge		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/3/18	Test Site	SR7

Frequency	Peak Measurement Level dBuV/m	Duty Cycle Factor dB	Average Measurement Level dBuV/m	Margin dB	Limit dBuV/m
MHz					

Horizontal

Average Detector:

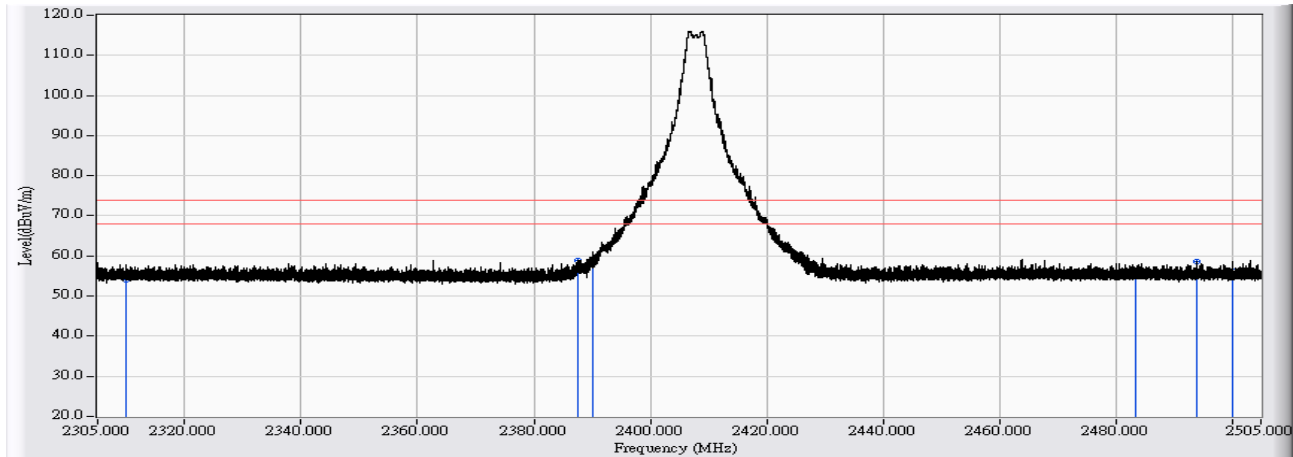
2389.91	57.677	-6.644	51.033	-2.967	54.000
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Average Measure Level=Peak Measure Level+20log(Duty Cycle)

Duty Cycle=(Ton/(Ton+Toff))=47.33/101.700=0.465

Duty Cycle correction factor=20log(0.465)=-6.644dB

Site : CB1	Time : 2016/03/18 - 16:54
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2408MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	29.201	24.888	54.090	-19.910	74.000	PEAK
2	*	2387.571	29.157	29.806	58.963	-15.037	74.000	PEAK
3		2390.000	29.155	29.096	58.252	-15.748	74.000	PEAK
4		2483.500	29.102	26.335	55.437	-18.563	74.000	PEAK
5		2493.907	29.096	29.446	58.542	-15.458	74.000	PEAK
6		2500.000	29.094	27.098	56.192	-17.808	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	2.4GHz Digital RF Module		
Test Item	Band edge		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/3/18	Test Site	SR7

Frequency	Peak Measurement Level dBuV/m	Duty Cycle Factor dB	Average Measurement Level dBuV/m	Margin dB	Limit dBuV/m
MHz					

VERTICAL

Average Detector:

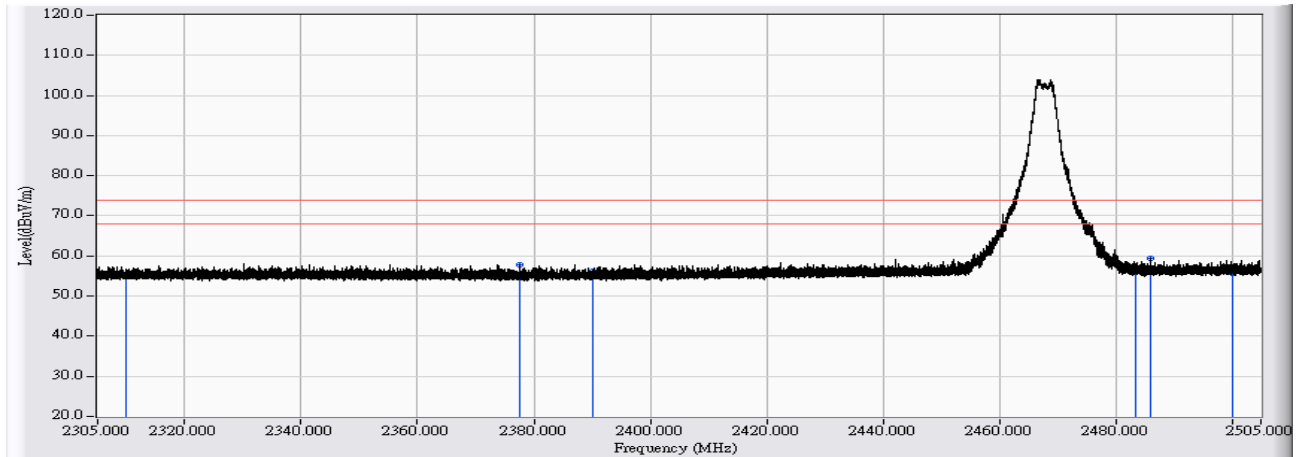
2387.571	58.963	-6.644	52.319	-1.681	54.000
----------	--------	--------	--------	--------	--------

Average Measure Level=Peak Measure Level+20log(Duty Cycle)

Duty Cycle=(Ton/(Ton+Toff))=47.33/101.700=0.465

Duty Cycle correction factor=20log(0.465)=-6.644dB

Site : CB1	Time : 2016/03/18 - 17:10
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	28.366	26.882	55.248	-18.752	74.000	PEAK
2		2377.504	28.656	29.086	57.742	-16.258	74.000	PEAK
3		2390.000	28.709	27.455	56.164	-17.836	74.000	PEAK
4		2483.500	29.110	27.509	56.619	-17.381	74.000	PEAK
5	*	2485.980	29.121	30.287	59.408	-14.592	74.000	PEAK
6		2500.000	29.183	26.571	55.753	-18.247	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	2.4GHz Digital RF Module		
Test Item	Band edge		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/3/18	Test Site	SR7

Frequency	Peak Measurement Level dBuV/m	Duty Cycle Factor dB	Average Measurement Level dBuV/m	Margin dB	Limit dBuV/m
MHz					

Horizontal

Average Detector:

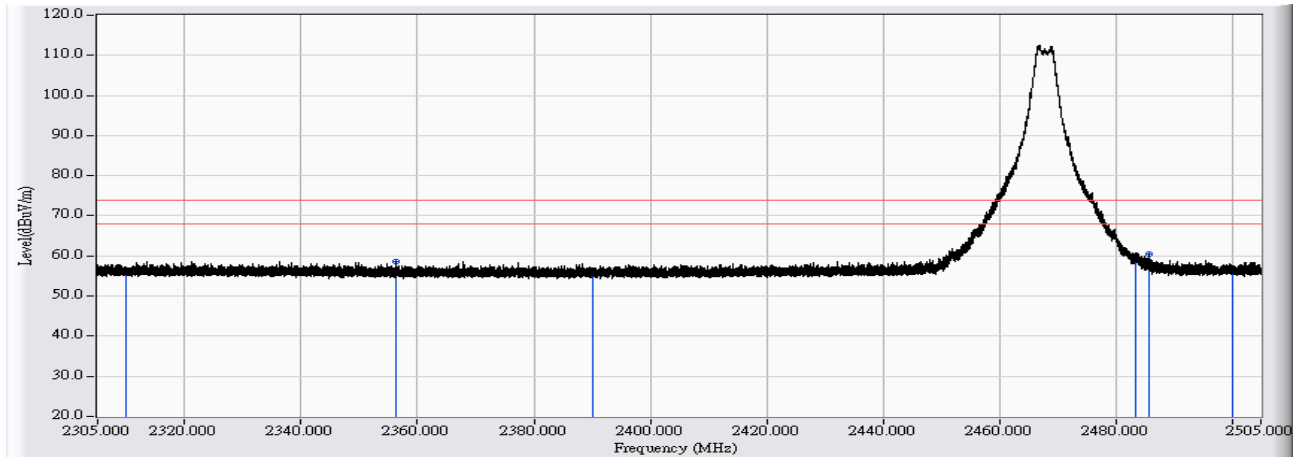
2485.98	59.408	-6.118	53.290	-0.710	54.000
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Average Measure Level=Peak Measure Level+20log(Duty Cycle)

Duty Cycle=(Ton/(Ton+Toff))=47.33/101.700=0.465

Duty Cycle correction factor=20log(0.465)=-6.644dB

Site : CB1	Time : 2016/03/18 - 17:07
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5 V (Power by PC)
EUT : 2.4GHz Digital RF Module	Note : 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2310.000	29.201	26.545	55.747	-18.253	74.000	PEAK
2		2356.398	29.175	29.458	58.633	-15.367	74.000	PEAK
3		2390.000	29.155	26.348	55.504	-18.496	74.000	PEAK
4		2483.500	29.102	29.945	59.047	-14.953	74.000	PEAK
5	*	2485.707	29.100	30.982	60.082	-13.918	74.000	PEAK
6		2500.000	29.094	27.150	56.244	-17.756	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	2.4GHz Digital RF Module		
Test Item	Band edge		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/3/18	Test Site	SR7

Frequency	Peak Measurement Level dBuV/m	Duty Cycle Factor dB	Average Measurement Level dBuV/m	Margin dB	Limit dBuV/m
MHz					

VERTICAL

Average Detector:

2485.707	60.082	-6.118	53.964	-0.036	54.000
----------	--------	--------	--------	--------	--------

Average Measure Level=Peak Measure Level+20log(Duty Cycle)

Duty Cycle=(Ton/(Ton+Toff))=47.33/101.700=0.465

Duty Cycle correction factor=20log(0.465)=-6.644dB

7. DTS Occupied Bandwidth

7.1. Test Equipment

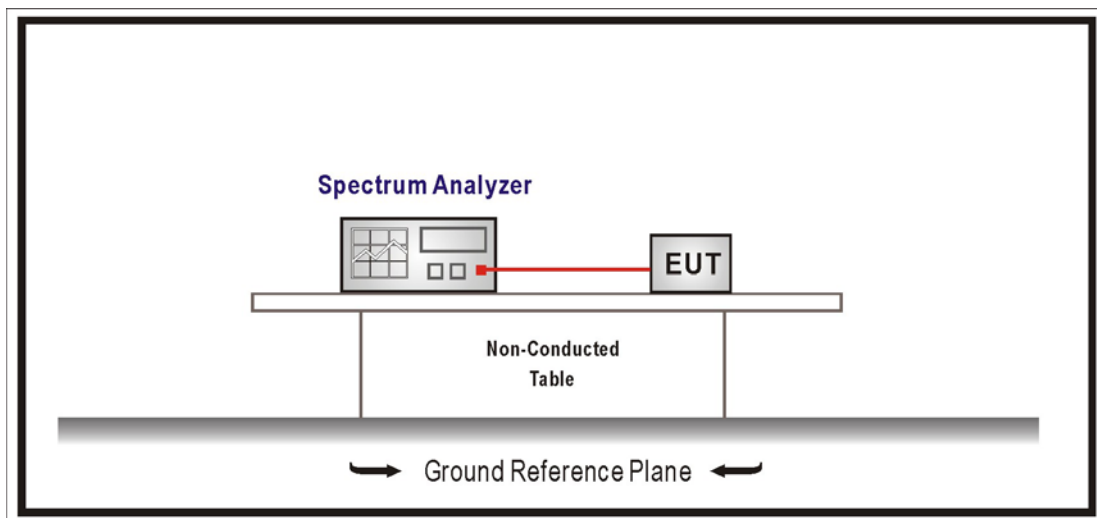
The following test equipments are used during the test:

DTS Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23

Note: All equipments that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Test Procedures

The EUT was setup according to ANSI C63.10:2013; tested procedure section 8.1 of KDB558074 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100KHz, Set the VBW $\geq 3 \times$ RBW, Sweep Time=Auto, Set Peak Detector.

7.4. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.5. Test Specification

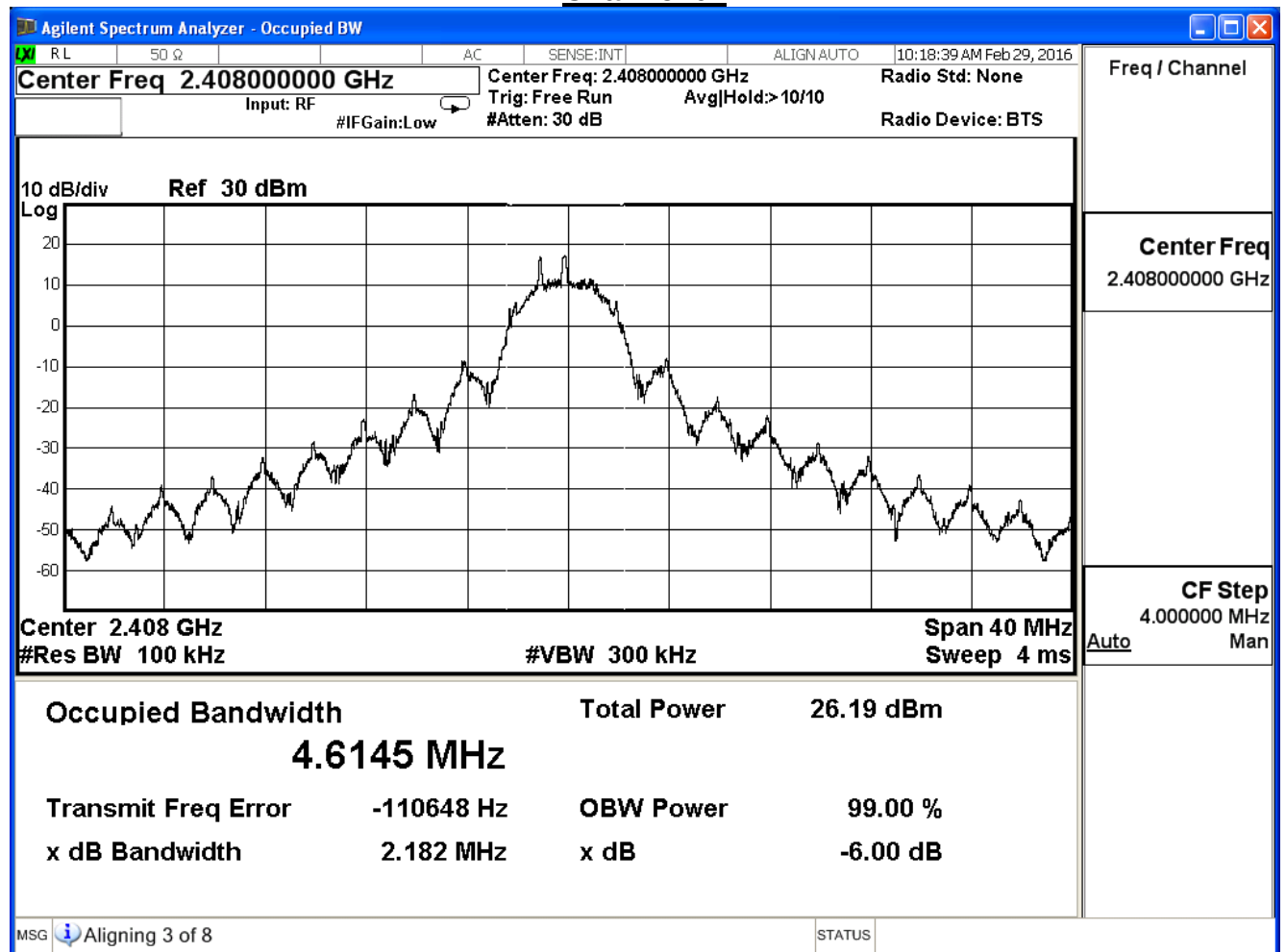
According to FCC Part 15 Subpart C Paragraph 15.247: 2014

7.6. Uncertainty

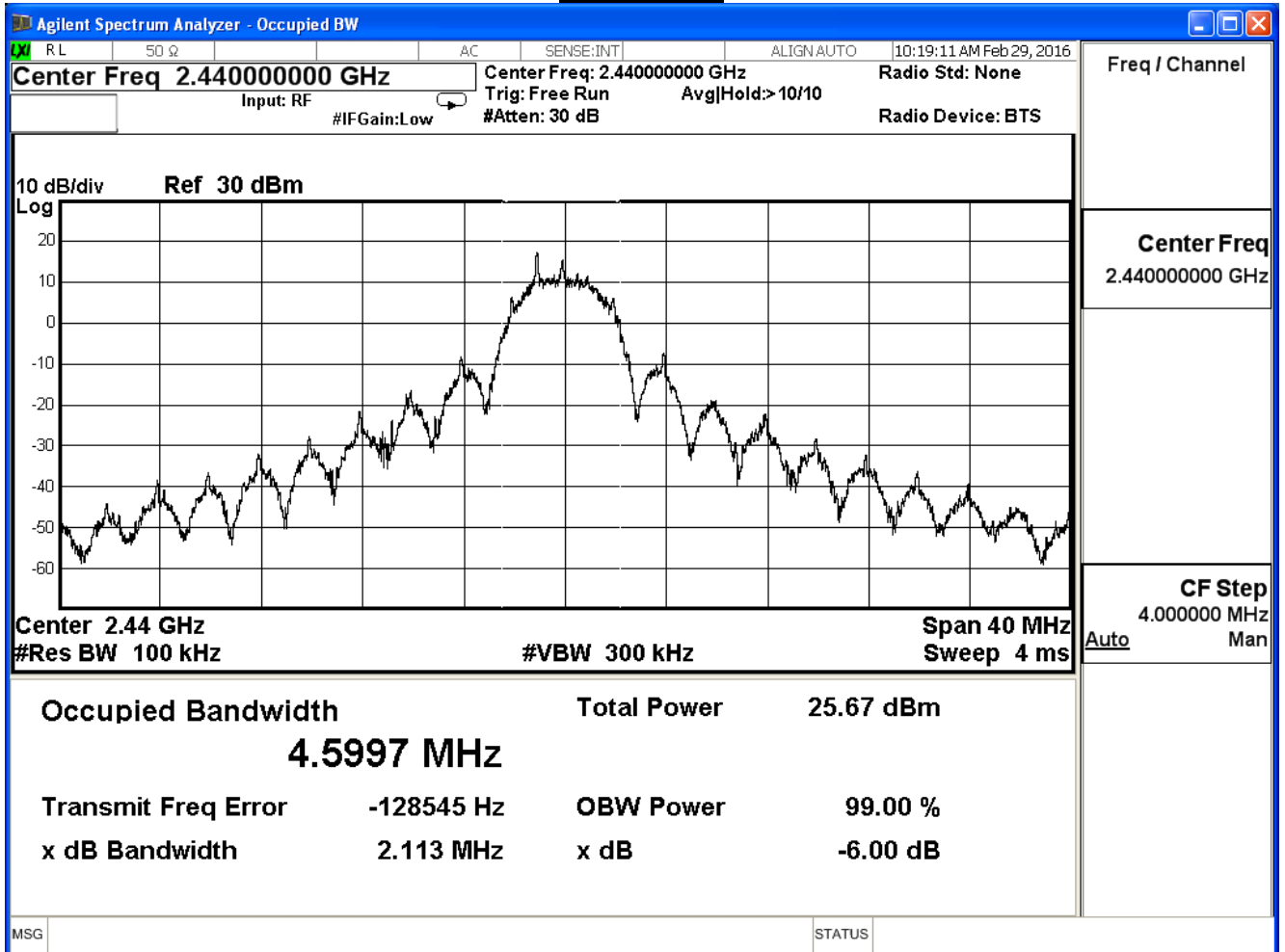
The measurement uncertainty is defined as $\pm 150\text{Hz}$

Product	2.4GHz Digital RF Module		
Test Item	DTS Occupied Bandwidth		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/02/29	Test Site	SR7

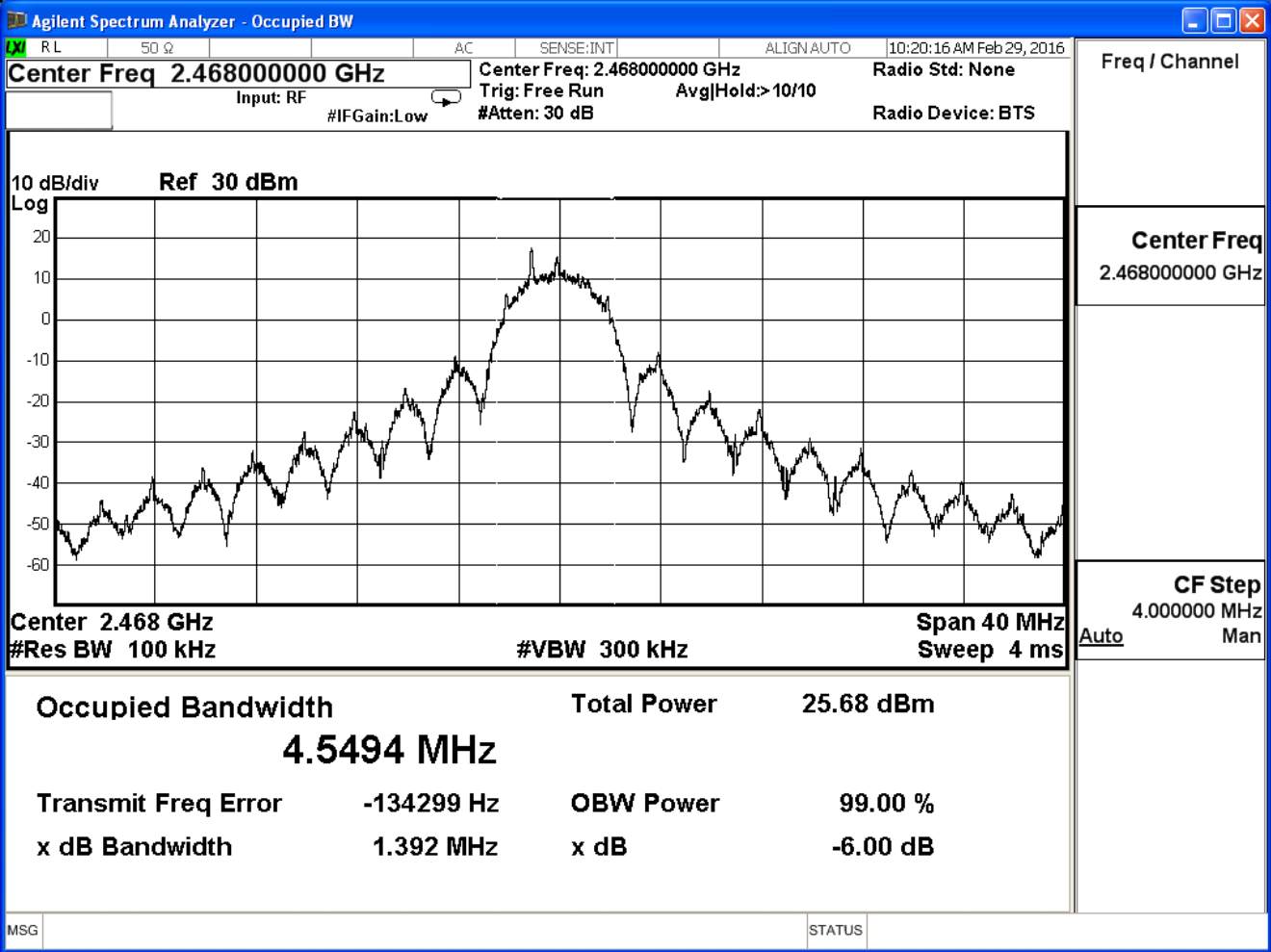
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
01	2408	2.182	≥ 0.5	Pass
09	2440	2.113	≥ 0.5	Pass
16	2468	1.392	≥ 0.5	Pass



Channel 09



Channel 16



8. Power Density

8.1. Test Equipment

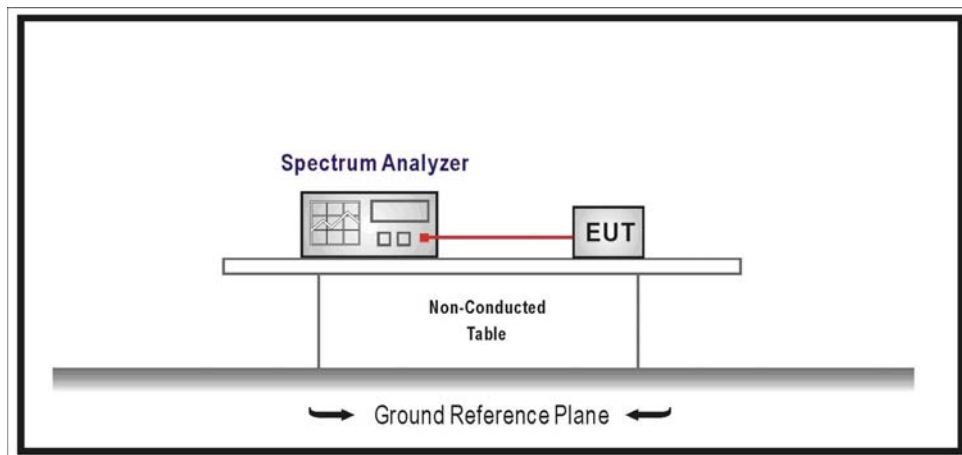
The following test equipment is used during the test:

Power Density / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/05
Signal Analyzer	R&S	FSV7	101650	2016/11/30

Note: All equipments that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

8.4. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 V03R04 for compliance to FCC 47CFR 15.247 requirements.

8.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247

8.6. Uncertainty

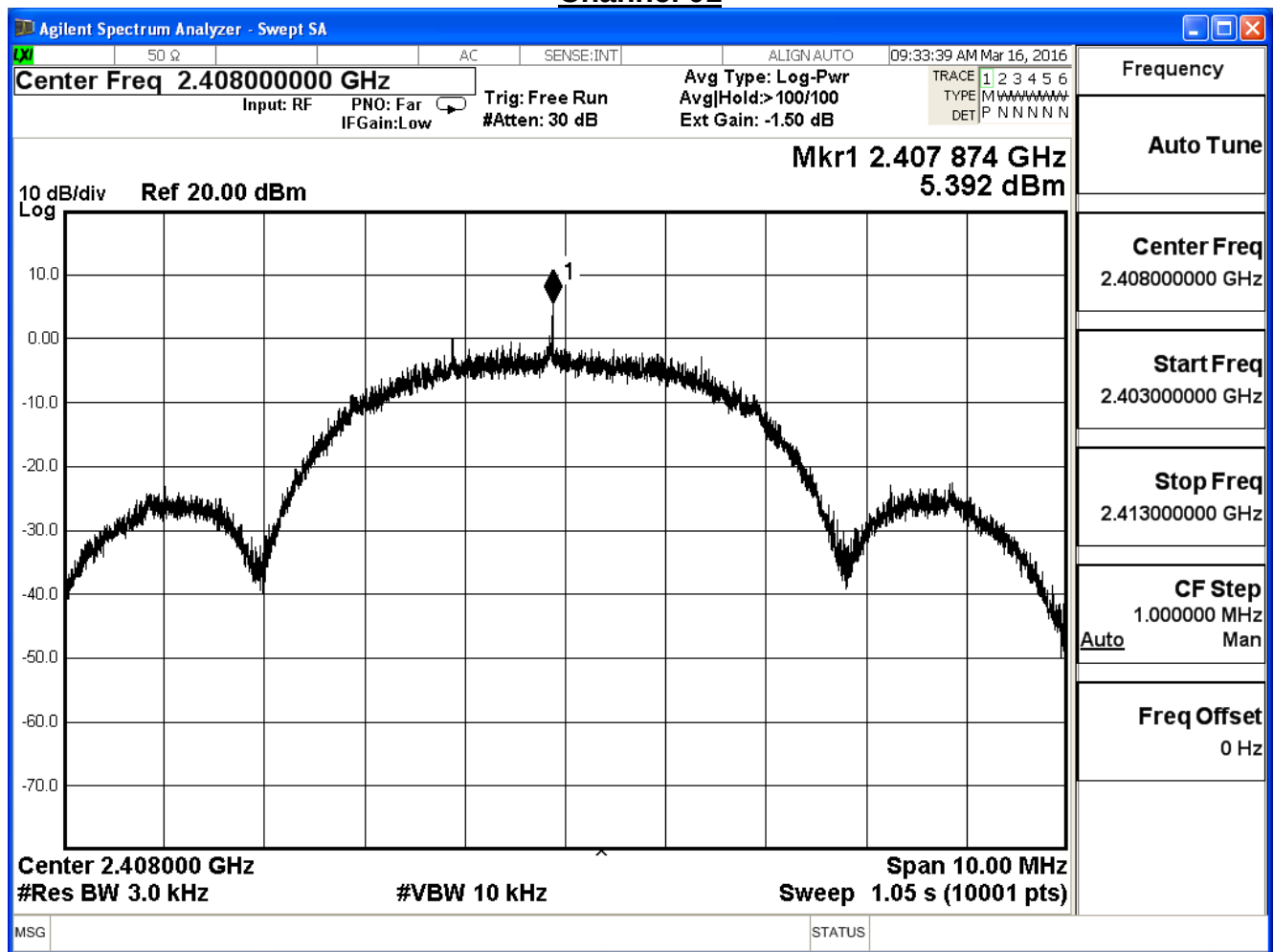
The measurement uncertainty is defined as $\pm 1.27\text{dB}$.

8.7. Test Result

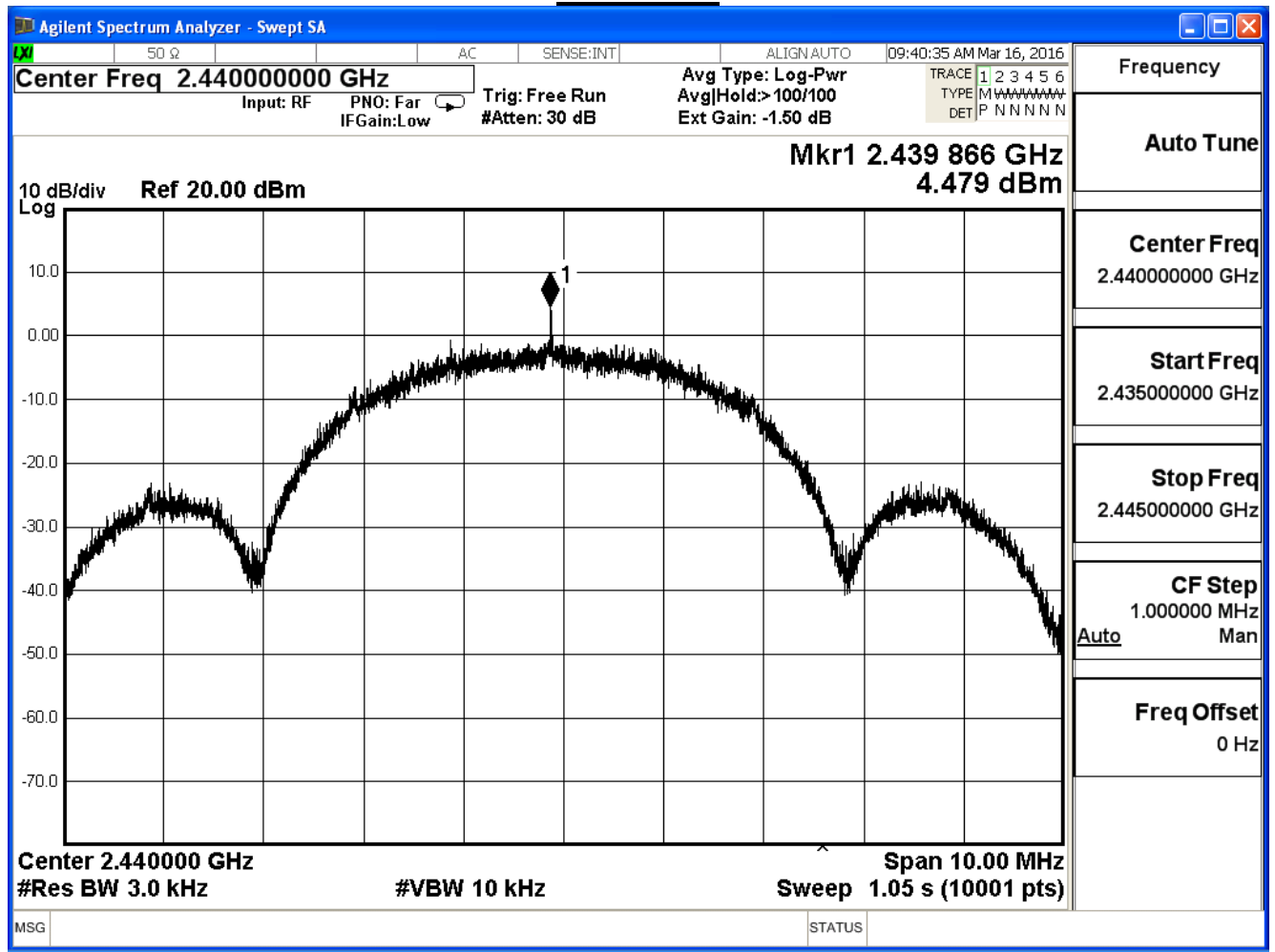
Product	2.4GHz Digital RF Module		
Test Item	Power Density		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2016/03/18	Test Site	SR7

Channel No.	Frequency (MHz)	Measure Level(dBm)	Limit (dBm)	Result
01	2408	5.392	≤ 8	Pass
09	2440	4.479	≤ 8	Pass
16	2468	6.901	≤ 8	Pass

Channel 01



Channel 09



Channel 16

